



## CMOP Undergraduate Intern Mentoring Opportunity

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**Deadline: March 28, 2011**

**Selections Announced: April 1, 2011**

*Name/Title/Institution(s) of senior mentor(s):*

Professor Bradley Tebo, Division of Environmental & Biomolecular Systems, OHSU.

*Name/Title/Institution(s) of frontline mentor(s):*

Dr. Roberto Anitori, Division of Environmental & Biomolecular Systems, OHSU.

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***Project Title:* Manganese and iron oxidizing microbial diversity of Antarctic volcanic rocks, soils and waters.**

***Context for Project:*** The proposed intern project forms part of a larger 5 year study entitled “Microbially mediated alteration of volcanic glass using McMurdo extreme environments as natural laboratories”. The major goal is to identify and study the functions, especially in relation to manganese and iron oxidation, of the microbial consortia that associate with the weathering of basalt glass in these (generally) organic nutrient poor extreme environments. The environments in which these “rock-eating” microbes will be sought include water below ice-covered Lake Fryxell (Taylor Valley), hydrothermal vents and ice caves in the glaciers of Mt Erebus, and seasonal creeks through volcanic terrain that are fed by glacial melting in the short Antarctic summer.

***Brief Description.***

EBS: The major research goals of the Tebo laboratory are focused on manganese (and to lesser extent) iron oxidizing microbes. This strategy includes studies aimed at isolating oxidizers from the environment, identifying them, and characterizing the genetic and biochemical basis of their oxidation mechanisms.

*Please describe project as it relates to research goals of the laboratory group.* The proposed intern project, focused as it is on identifying Mn and Fe oxidizers from Antarctica, fits perfectly into the broader research goals of the Tebo Lab.

The intern will be involved in both culture and culture-independent methods for characterizing microbes in Antarctic samples collected in late 2010.

Culture studies:

- Screening of samples for targeted organisms – e.g. slush agar tubes for iron oxidizers; plate and liquid enrichment cultures for Mn oxidizers; enrichments using volcanic substrates.

- Purification of isolates using techniques such as streaking for isolation and extinction dilution.
- Identification of isolates using 16S rRNA-based methods (DNA extraction, PCR, sequencing).

Culture-independent studies:

- Extraction of DNA from frozen samples, followed by construction of 16S rRNA libraries for sequence-based identification of the endogenous microbial community.
- Screening of sample DNA for the presence of functional genes (e.g. for Fe and Mn oxidation or carbon fixation).

***Proposed Outcomes/Broader Impact:***

**Outcomes:** (i) identification of the microbial populations inhabiting extreme volcano-associated environments; (ii) do these environments support the growth of microorganisms that utilize nutrients (e.g. Mn, Fe) found in volcanic rocks and soils? **Broader impact:** Very little is known about the “rock-eating” microbes targeted in this project. For example, there have been no published studies on the microbial diversity of the Erebus ice caves. Therefore, the results obtained will provide important insights into the microbial communities involved, how they interact with the volcanic rocks, and which benefits they may gain from this interaction.

***Proposed timeline (within a 10 week span):***

Weeks 1-3 – Extract DNA from samples; conduct PCRs; construct clone libraries; subculture isolates from initial cultures; set-up fresh cultures.

Weeks 4-6 – Sequence clones; monitor cultures; subculture oxidation positive isolates.

Weeks 7-10 – identify isolates by 16S rRNA PCR and sequencing; analyse clone library and isolate sequence data.

***Intern academic experience and skill set should include:***

*Please list majors you would consider, preferred course background, any other needed skills.*

Majors: Biology, Microbiology, Molecular Biology, Biochemistry

Our preference is for an intern with laboratory experience, particularly in microbiological and recombinant DNA techniques.

*Please note if you are willing to work with a less experienced intern (freshmen or sophomore) or require a more experienced candidate (junior or senior).*

Preference for a junior or senior.